

Summary of SWPC Enlil Metrics Discussion, Sept 25, 2017

Keep in mind research metrics vs NRT metrics

There are things you can readily test and verify in research (hindsight) mode that are impractical in NRT forecasting mode. Hence metrics for the two logically differ.

Below we focus on metrics for research mode applications

Enlil Metrics

Currently, CME arrival time is the only widely used metric for comparing predictions with observed arrivals, which are well-defined for significant CMEs

- SWPC defines forecast arrival as “middle” of velocity rise in medium grid soln
- CCMC defines as 1st few points of velocity rise in coarse grid soln
- (In operations, forecasters typically adjust predicted arrival times to account for other factors, such as WSA accuracy, confidence in CME fit parameters, etc.)
- Given all the uncertainties, differences in how arrival time is defined is not a big deal

Other simple potential metrics (sheath only):

- Density pile-up
- CME-front $|B|$ (not B_z)
- TBD define measures for real data:
 - Peak or use mean or median over some temporal window?
 - Timing and magnitude? (can differ from that of velocity)
- “Driver gas” (related to head-on vs edge vs clear miss definitions TBD)
 - Enlil defines via tracer particles (but not very precisely)
 - How to identify in real SW (ref Cane and Richardson papers)
 - B-structure
 - Composition (charge state / species)
 - Bi-directional electrons
- Identify data sources to be used

WSA Metrics

Currently,

- SWPC keeps None

Possible metrics:

- 1 AU speed and polarity are only potential metrics

How and what would you quantify?

- The flow speed in front of a CME has a significant effect on its propagation time
- So, narrow consideration to the ambient flow just in front of CMEs
 - Ignore CIRS, non-CME flows, stats on those are separate issue
 - Same for B polarity
- What averaging range? days? hrs?
- Distinguish between flows perturbed by known prior transient vs simple WSA “miss”